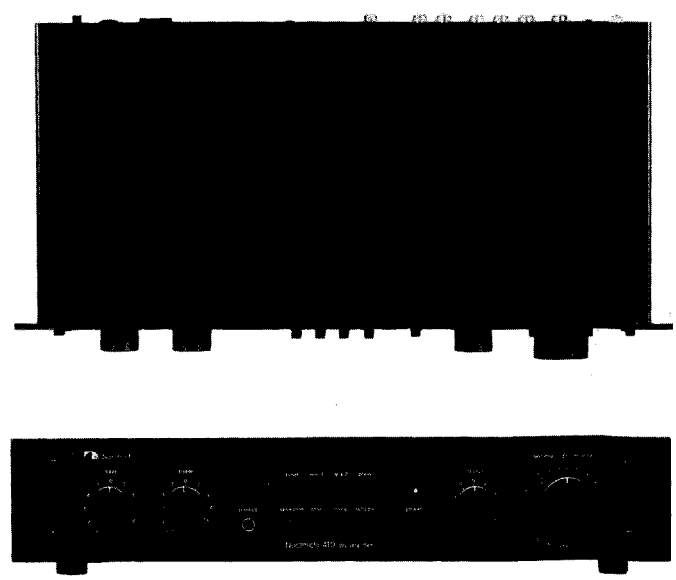
Nakamichi

Service Manual

Nakamichi 410

control preamplifier



410

CONTENTS

1. **General** 1
2. **Principle of Operation** 3
   - 2.1. Mute Signal 3
   - 2.2. Phono (RIAA) Equalization Amplifier 3
   - 2.3. Sub-sonic Filter 4
3. **Removal Procedures** 5
   - 3.1. Top Cover, Bottom Cover and Front Panel 5
   - 3.2. Main P.C.B. Ass'y and Tone P.C.B. Ass'y 5
   - 3.3. Headphone Jack, Push Button Ass'y and Lamp 5
   - 3.4. Rear Panel Ass'y 5
   - 3.5. Power Supply P.C.B. Ass'y and Power Transformer 5
4. **Electrical Adjustments** 6
   - 4.1. Phono Equalization Amplifier Distortion 6
   - 4.2. Tone Control Frequency Response 6
5. **Mounting Diagrams and Parts List** 7
   - 5.1. Main P.C.B. Ass'y 7
   - 5.2. Tone P.C.B. Ass'y 9
   - 5.3. Function SW. P.C.B. Ass'y 9
   - 5.4. Jack P.C.B. Ass'y 9
   - 5.5. Power Supply P.C.B. Ass'y 9
6. **Mechanism Ass'y and Parts List** 10
   - 6.1. Synthesis 10
   - 6.2. Mechanism Chassis Ass'y (A01) 11
   - 6.3. Front Chassis Ass'y (A02) 12
   - 6.4. Rear Panel Ass'y (A03) 12
7. **Wiring Diagram** 13
8. **Performance Data** 14
9. **Block Diagram and Level Diagram** 15
10. **Schematic Diagram** 16
11. **Specifications** 18

1. GENERAL

Nakamichi 410 control functions are shown below.

1. Input Selector Button "tuner"
2. Input Selector Button "aux 1"
3. Input Selector Button "aux 2"
4. Input Selector Button "phono"
5. Tone Control "bass"
6. Tone Control "treble"
7. Headphone Jack
8. Tape Monitor Switch
9. Tone Control Defeat Switch
10. Mono Switch
11. Sub-sonic Filter Switch
12. Power Switch
13. Power Indicator Pilot Light
14. Contour Control
15. Balance Control
16. Volume Control
17. Ground Terminal
18. Phono Input Sensitivity Selector Switch
19. Phono Input Jacks
20. Auxiliary Input Jacks
21. Tuner Input Jacks
22. Tape Playback Input Jacks
23. Tape Record Output Jacks
24. Preamplifier Output Jacks
25. AC Outlets
26. AC Power Cord
27. AC Voltage Selector Switch

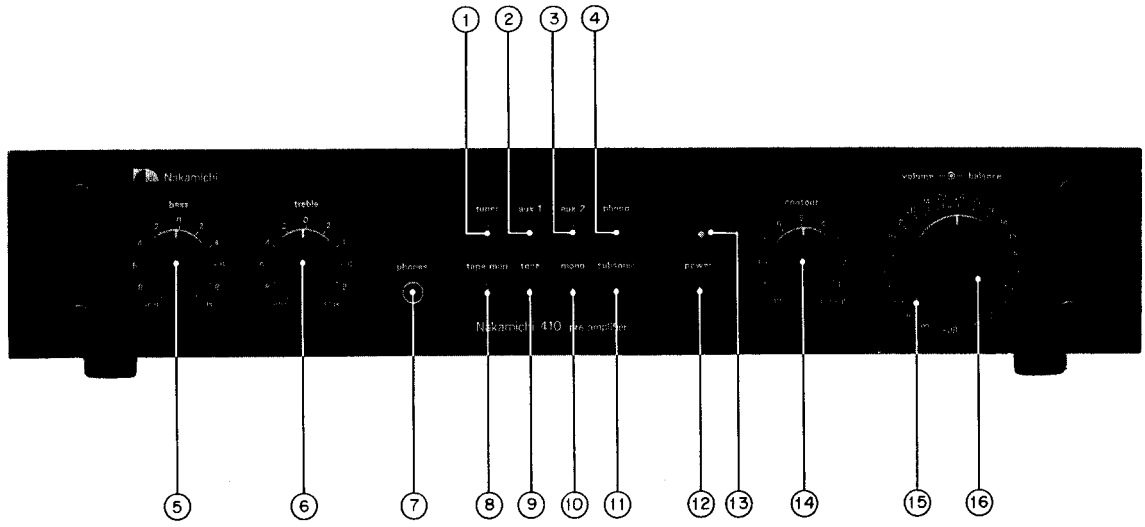


Fig. 1.1

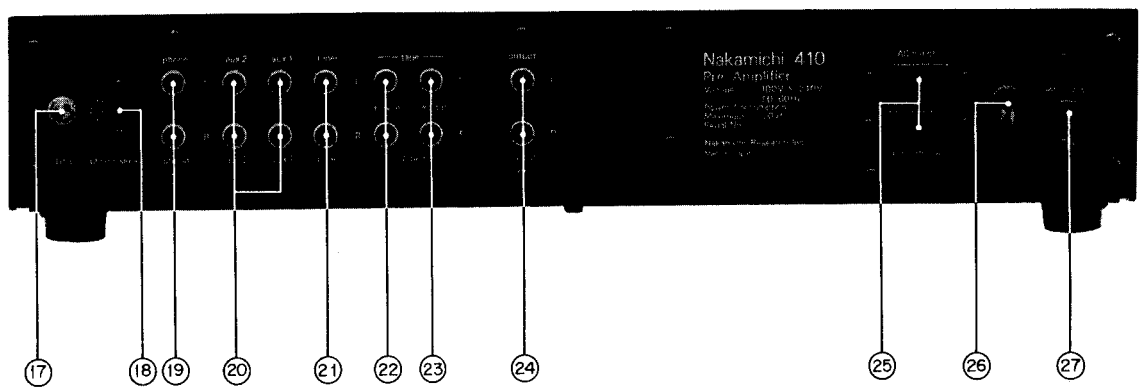


Fig. 1.2

Voltage Selector

Change-over either to 100~120V or 220~240V.

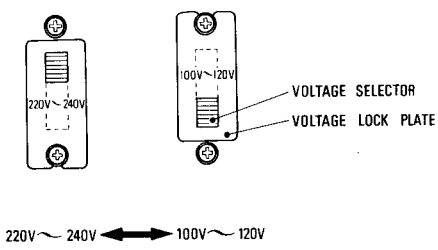


Fig. 1.3

2. PRINCIPLE OF OPERATION

2.1. Mute Signal

Output signals are muted for a certain time to prevent transient noise when power is on or off. Fig. 2.1 shows the mute circuit and Fig. 2.2 shows a timing chart of the mute signals.

Power On

Transformer output is rectified through diode D703 and smoothed by capacitor C705. Therefore, positive potential appears at C705 (transistor Q709 base). That is, Q709 is in the cutoff state, while C706 (22μF) is charged with negative potential through R715 (1MΩ). At the level where the voltage across C706 exceeds Vbe (base-emitter voltage) of Q710, Q710 turns from off to on. As a result, Q711 turns on and the mute signal is changed from +10V to −10V, releasing the mute state. This means the mute time depends on C706 and R715 after power is on.

Power Off

Transformer output becomes zero and so C705 is charged with negative potential through R714. At the level where the voltage across C705 exceeds Vbe of Q709, Q709 turns from off to on and C706 is quickly discharged. Thus, Q710 is cut off and Q711 is also cut off.

The mute signal voltage becomes positive to mute the output signal. D704 acts to prevent +10V from being discharged easily when power is off.

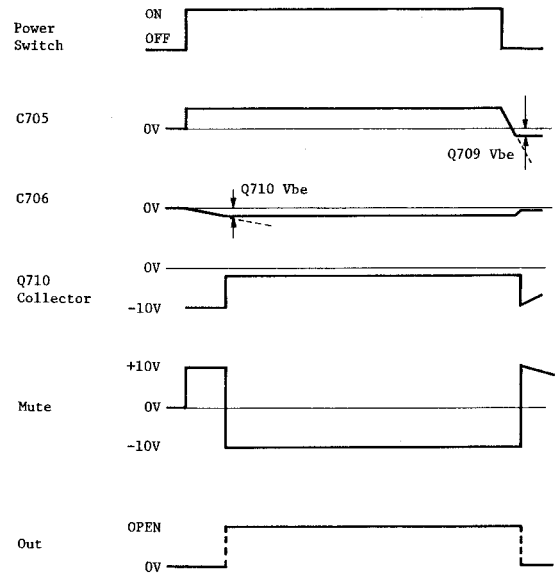


Fig. 2.2

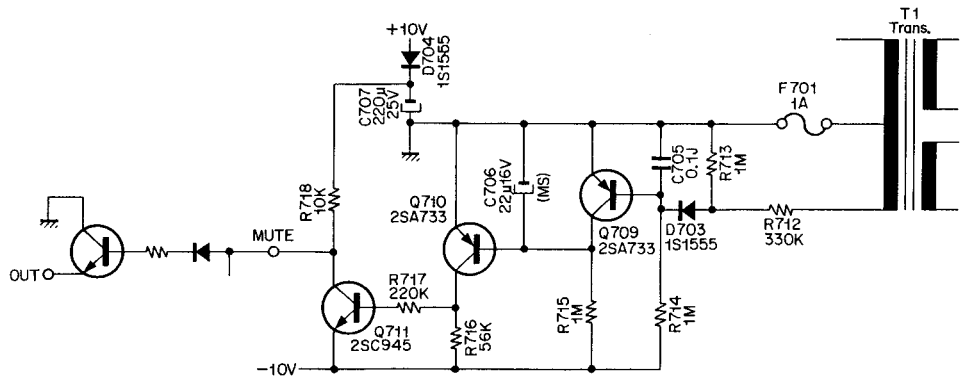


Fig. 2.1

2.2. Phono (RIAA) Equalization Amplifier

The phono input sensitivity selector of the 410 phono equalization amplifier allows switching the sensitivity to 1mV, 2mV and 5mV so that you can select proper sensitivity matching the output level of your cartridge. (Input impedance is 100KΩ constant.) This makes it possible to prevent an excessive input and to directly connect an MC cartridge without a booster.

To realize a better S/N ratio, a triple transistor configuration shown in Fig. 2.3 is employed at the first stage. (On the 410, design considerations have been taken to eliminate thermal noise (En) produced by the transistor base input resistor (hie).)

As shown in Fig. 2.4 (a model of transistor showing the noise components), signal source impedance Rs is connected in series to the transistor base input resistance hie.

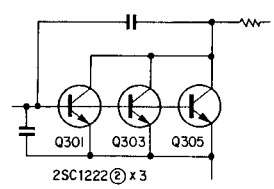


Fig. 2.3

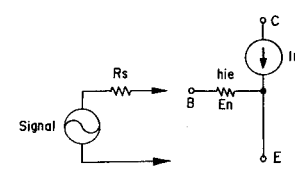


Fig. 2.4

In: Transistor current noise
Rs: Signal source impedance
hie: Transistor base input resistance
En: Thermal noise by hie

In such a circuit, Rs is usually larger than hie and in many cases, the thermal noise produced by Rs exceeds En and En is apt to be ignored.
However, for an MC cartridge whose Rs is very small (tens ~ hundreds ohms), hie will have great influence to the S/N ratio.
To solve this problem, the 410 employs a unique circuit — triple transistor system — where hie can be reduced 1/3 the conventional level and En to $1/\sqrt{3}$. Together with application of this special circuit, the 410 utilizes low-noise transistors, producing little current noise In to improve the S/N ratio by approx. 10dB.

2.3. Sub-sonic Filter

Today, the frequency response of ordinary hi-fi phono cartridges covers the sub-sonic range. The resonance point is near 10Hz with a peak of 5 ~ 15dB. These factors are determined by the mass, compliances and damping resistance of the cartridge and tone arm. Further, near the resonance frequency, the disc record is likely to be eccentric or warped, or the turntable vibrates abnormally. In extreme cases, the resonance frequency increases to the level of disc record playback signals. (The worst condition occurs when the vibration caused by the speaker is fed back to the cartridge via air or floor vibration.)
Usually, the sub-sonic effect thus produced is not found. Because of inter-modulation distortion, the sub-sonic effect causes unclean sound from amplifiers, speakers or tape decks. It especially affects such systems whose response curves cover lower frequencies. (Note that, if the woofer moves unsteadily during playback of disc records, the above-mentioned adverse effect can be produced.)

The turntable, cartridge and tone arm must be improved to completely eliminate sub-sonics. However, even improved turntable, etc. could not completely eliminate sub-sonics.
One solution of this problem so far achieved is using commercially available preamplifiers that incorporate sub-sonic filters. But most of them shows poor attenuation curves of 6dB/oct or 12dB/oct, and they can not sufficiently eliminate sub-sonics. And they have fault to attenuate the low frequency band (near 30 ~ 40Hz).

The sub-sonic filter used in the 410, based on the new active filtration technology, can realize an ideal filter characteristic.

Fig. 2.5 shows the sub-sonic filter of the 410. The portion represented by F_T is generally known as a twin T filter. Its characteristics are illustrated in Fig. 2.6 (1). As shown, the curve of the twin T filter rapidly drops at 20 ~ 50Hz, and attenuation at below 5Hz is rather small. These demerits have been smartly eliminated by the 410 as follows:

Improvement 1: Improved Twin T Filter with Boot Strap
As shown in Fig. 2.5, the output from the twin T filter is amplified by Q201 and taken out from its emitter. This output provides positive feedback to the base of Q201 through C207 and R207. This greatly reduces the level down in the range 20 ~ 50Hz. For greater attenuation in the range below 5Hz, R209 is added to lower the load impedance of the filter and to change the impedance of each element so that the asymmetric curve as shown by Fig. 2.6 (2) can be achieved.

Improvement 2: Addition of CR Filter
The curve shown in Fig. 2.6 (2) is satisfactory for the sub-sonic filter except insufficient attenuation at below 5Hz.
Besides the 410 uses a CR filter consisting of C209 and R217 to achieve a more ideal sub-sonic filter curve as shown by Fig. 2.6 (4). (In Fig. 2.6. (3) shows the CR filter curve and (4) is a combination of curves (2) and (3).)

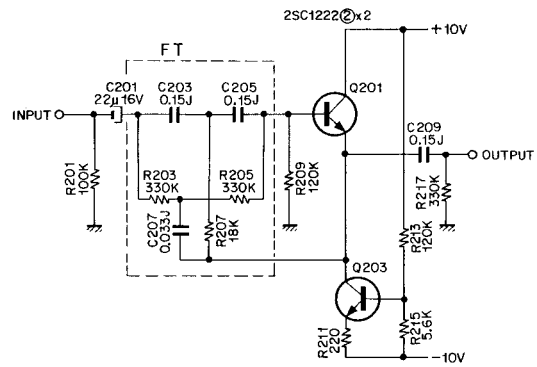


Fig. 2.5

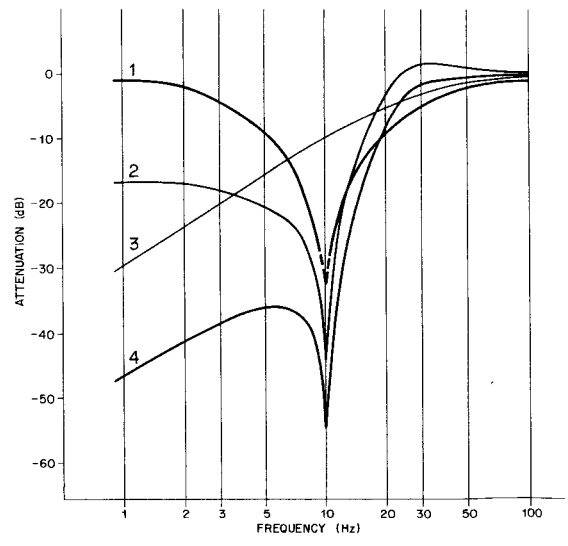


Fig. 2.6

3. REMOVAL PROCEDURES

3.1. Top Cover, Bottom Cover and Front Panel Ass'y
Refer to Fig. 3.1. Remove F01 and F02 (top cover), F03 and F04 (bottom cover), F05, F06 and F07 (knobs), then F08 and F09 (front panel ass'y).

3.2. Main P.C.B. Ass'y and Tone P.C.B. Ass'y
Refer to Fig. 3.2. Remove front panel ass'y referring to item 3.1.
Remove F01, F02, F03, F04, F05 and F06 (tone P.C.B. ass'y), then F07, F08, F09, F10 and F11 (main P.C.B. ass'y).

3.3. Headphone Jack, Push Button Ass'y and Lamp
Refer to Fig. 3.3. Remove front panel ass'y referring to item 3.1.
Remove F01, F02, F03 and F04 (headphone jack), F05, F06, F07, F08 and F15 (front chassis), F09 and F10 (push button ass'y), then F11, F12 (lamp shade), F13 (lamp) and F14 (lamp filter).

3.4. Rear Panel Ass'y
Refer to Fig. 3.4. Remove front panel ass'y referring to item 3.1.
Remove F01, F02 and F03, then F04 (rear panel ass'y).

3.5. Power Supply P.C.B. Ass'y and Power Transformer
Refer to Fig. 3.5. Remove front panel ass'y referring to item 3.1.
Remove F01, F02 and F03 (power supply P.C.B. ass'y), then F04 and F05 (power transformer).

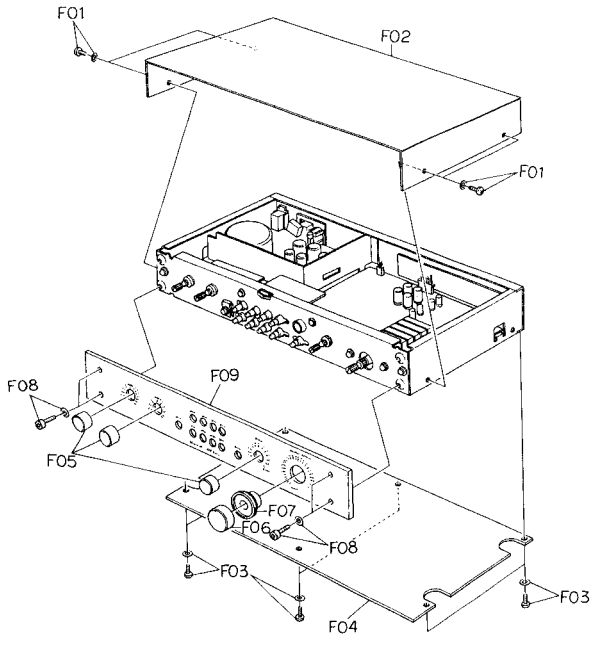


Fig. 3.1

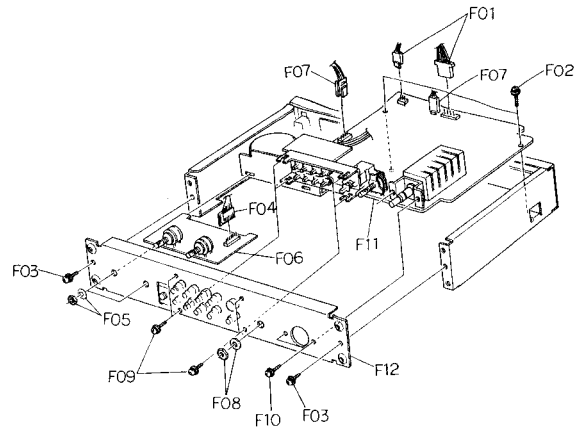


Fig. 3.2

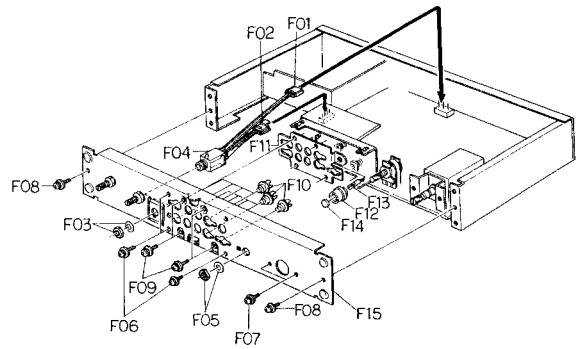


Fig. 3.3

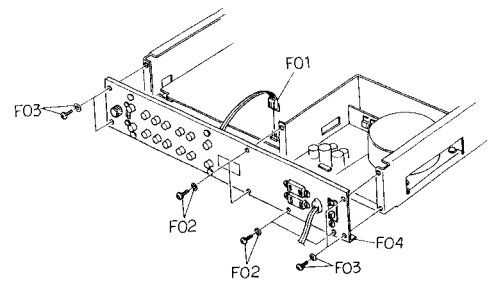


Fig. 3.4

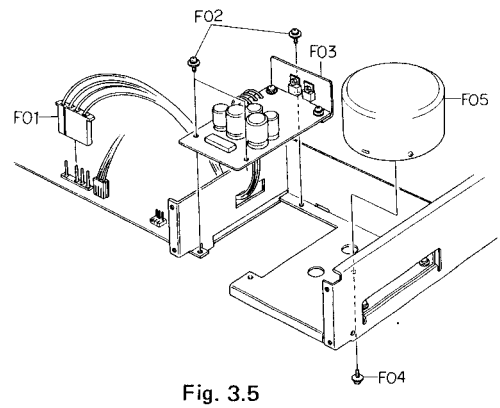


Fig. 3.5

4. ELECTRICAL ADJUSTMENTS

4.1. Phono Equalization Amplifier Distortion

See Fig. 4.1.

In the 410 phono equalization amplifier, resistors R143 and R144 are adjusted in the range 100K ~ 150KΩ in order to improve the distortion factor in its low frequency band. (The standard value of these Rs is 150KΩ.)

Connect an oscillator to the phono input, and a distortion meter to the rec-out. Depress the function switch "phono", and set the balance control to the center position, volume control to the minimum position and input sensitivity selector switch on the rear panel of the 410 to 2mV.

Feed in 100Hz and adjust the output of the oscillator to obtain 2V at the rec-out.

This adjustment must ensure that the measured distortion factor is within the specified range (less than 0.003%). The instruments used for the distortion adjustment must have a sufficiently good S/N ratio and distortion factor.

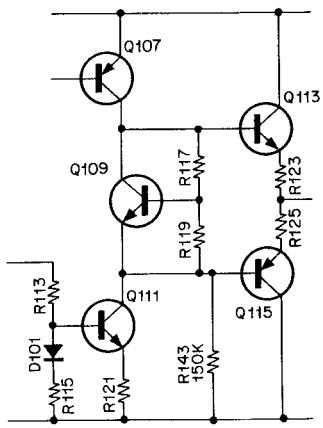


Fig. 4.1

4.2. Tone Control Frequency Response

See Fig. 4.2.

Connect an oscillator to the aux, and an AC voltmeter to the output terminal and depress the tone switch.

Set the bass and treble controls to "flat" (position "0"), balance control to the center position and contour control to "0" position. Feed in 1KHz and adjust the volume control to obtain 1V (for example) on the voltmeter.

Then feed in 30Hz and adjust VR603 and VR604 so as to obtain a flat response for 1KHz.

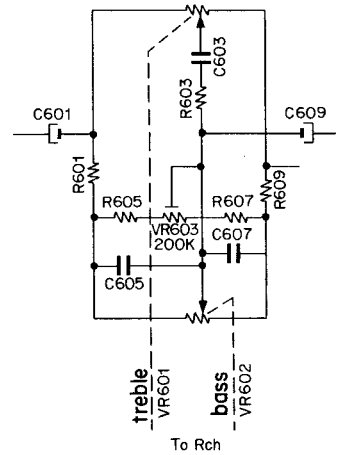


Fig. 4.2

5. MOUNTING DIAGRAMS AND PARTS LIST

Note: Mounting diagram shows a dip side view of the printed circuit board.

5.1. Main P.C.B. Ass'y

Schematic Ref. No.	Part No.	Description
	BA03817A	**Main P.C.B. Ass'y**
		– PHONO EQ. AMP. –
Q101,102 103,104 105,106	0B06071A	Transistor 2SC945 (L) (1)
Q107,108 115,116	0B06013A	Transistor 2SA733
Q109,110 111,112 113,114	0B01872A	Transistor 2SC945 (L)
D101,102	0B01909A	Silicon Diode 1S1555
R101,102	0B05665A	Carbon Resistor 560K ERD-14 VJ
R103,104	0B05568A	Carbon Resistor 120K ERD-14 VJ
R105, 106	0B05558A	Carbon Resistor 100 ERD-14 VJ
R107,108	0B05918A	Metal Film Resistor 127 ERO-25 VKG
R109,110	0B05511A	Carbon Resistor 820 ERD-14 VJ
R111,112	0B05650A	Carbon Resistor 12K ERD-14 VJ
R113,114	0B05563A	Carbon Resistor 56K ERD-14 VJ
R115,116	0B01781A	Carbon Resistor 1K ERD-14 VJ
R117,118	0B01879A	Carbon Resistor 33K ERD-14 VJ
R119,120	0B05538A	Carbon Resistor 27K ERD-14 VJ
R121,122	0B05607A	Carbon Resistor 180 ERD-14 VJ
R123,124 125,126	0B05663A	Carbon Resistor 10 ERD-14 VJ
R127,128	0B05901A	Metal Film Resistor 27K ERO-25 CKG
R129,130	0B01921A	Carbon Resistor 330K ERD-14 VJ
R131,132	0B05910A	Metal Film Resistor 2.2K ERO-25 VKF
R133,134	0B05561A	Carbon Resistor 18K ERD-14 VJ
R135,136	0B05649A	Carbon Resistor 150 ERD-14 VJ
R137,138 139,140	0B05587A	Carbon Resistor 56 ERD-14 VJ
R141,142	0B05916A	Metal Film Resistor 31.6 ERO-25 VKG
R143,144	0B05593A	Carbon Resistor 150K ERD-14 VJ
C101,102	0B05636A	Tantalum Capacitor 22μ 16V
C103,104 121,122 123,124	0B05884A	Electrolytic Capacitor 470μ 10V
C105,106	0B01289A	Ceramic Capacitor 220P 50 VM
C107,108	0B05599A	Ceramic Capacitor 150P 50 VM
C109,110	0B05909A	Mylar Capacitor 0.12μ 50 VJ
C111,112	0B05557A	Mylar Capacitor 0.015μ 50 VJ
C113,114	0B05583A	Mylar Capacitor 0.033μ 50 VJ
C115,116	0B05659A	Mylar Capacitor 0.0056μ 50 VJ
C117,118	0B01412A	Electrolytic Capacitor 10μ 16 V
C119,120	0B05681A	Mylar Capacitor 0.01μ 50 VJ
		– LINE AMP. –
Q301,302 303,304 305,306	0B06062A	Transistor 2SC1222 (2)
Q307,308	0B06111A	Transistor 2SA640 (E)
Q309,310 311,312 313,314	0B01872A	Transistor 2SC945 (L)
D301,302	0B01909A	Silicon Diode 1S1555
R301,302	0B01921A	Carbon Resistor 330K ERD-14 VJ
R303,304	0B01789A	Carbon Resistor 330 ERD-14 VJ
R305,306	0B05912A	Metal Film Resistor 150 ERO-25 VKF
R307,308	0B05511A	Carbon Resistor 820 ERD-14 VJ
R309,310	0B01878A	Carbon Resistor 8.2K ERD-14 VJ
R311,312 321,322	0B05591A	Carbon Resistor 15K ERD-14 VJ
R313,314	0B05558A	Carbon Resistor 100 ERD-14 VJ
R315,316	0B05565A	Carbon Resistor 1.2K ERD-14 VJ
R317,318	0B05663A	Carbon Resistor 10 ERD-14 VJ
R319,320	0B05855A	Metal Film Resistor 1.5K ERO-25 VKF
R323,324 325,326	0B05567A	Carbon Resistor 33 ERD-14 VJ
C301,302	0B05820A	Electrolytic Capacitor 22μ 16V M (MS)
C303,304	0B05599A	Ceramic Capacitor 150P 50 VM
C305,306	0B01456A	Ceramic Capacitor 47P 50 VM
C307,308 309,310 311,312	0B05884A	Electrolytic Capacitor 470μ 10 V
		– HEADPHONE AMP. –
Q401,402	0B06013A	Transistor 2SA733
Q403,404	0B06062A	Transistor 2SC1222 (2)
Q405,406	0B06066A	Transistor 2SD471
Q407,408	0B06069A	Transistor 2SB564
D401,402	0B01702A	Silicon Varistor KB-269
R401,402	0B01877A	Carbon Resistor 6.8K ERD-14 VJ
R403,404	0B05511A	Carbon Resistor 820 ERD-14 VJ
R405,406	0B05591A	Carbon Resistor 15K ERD-14 VJ
R407,408	0B01788A	Carbon Resistor 68 ERD-14 VJ
R409,410 411,412	0B05663A	Carbon Resistor 10 ERD-14 VJ
R413,414	0B05563A	Carbon Resistor 56K ERD-14 VJ
R415,416	0B05565A	Carbon Resistor 1.2K ERD-14 VJ
R417,418	0B01795A	Carbon Resistor 4.7K ERD-14 VJ
C401,402 405,406	0B01412A	Electrolytic Capacitor 10μ 16 V
C403,404	0B05885A	Electrolytic Capacitor 100μ 10 V
		– SUB-SONIC FILTER –
Q201,202 203,204	0B06062A	Transistor 2SC1222 (2)
R201,202	0B01920A	Carbon Resistor 100K ERD-14 VJ
R203,204 205,206 217,218	0B01921A	Carbon Resistor 330K ERD-14 VJ
R207,208	0B05561A	Carbon Resistor 18K ERD-14 VJ
R209,210 213,214	0B05568A	Carbon Resistor 120K ERD-14 VJ
R211,212	0B05608A	Carbon Resistor 220 ERD-14 VJ
R215,216	0B05673A	Carbon Resistor 5.6K ERD-14 VJ
C201,202	0B01862A	Electrolytic Capacitor 22μ 16 V
C203,204 205,206 209,210	0B05914A	Mylar Capacitor 0.15μ 50 VJ
C207,208	0B05583A	Mylar Capacitor 0.033μ 50 VJ
		– MUTE –
Q501,502	0B06070A	Transistor 2SC1636
D501,502	0B01909A	Silicon Diode 1S1555
R511,512	0B01792A	Carbon Resistor 470 ERD-14 VJ
R513,514	0B01920A	Carbon Resistor 100K ERD-14 VJ
		– MISCELLANEOUS –
	0B07699D	Main P.C.B.
VR501	0B07155A	Volume 100K (BH) x 2, 100K (A) x2
VR502	0B07156A	Volume 10K (A) x 2
SW1	0B07151A	Push SW. 2222
CN1	0B08127A	4P Plug Pin
CN2,3,4	0B08185A	3P-T Post
CN6	0B08300A	5P-H Connector Ass'y
CN7	0B08301A	7P-H Connector Ass'y
CN5	0B08236A	4P-T Post
R501,502 503,504	0B01920A	Carbon Resistor 100K ERD-14 VJ

Schematic Ref. No.	Part No.	Description
R505,506	0B05565A	Carbon Resistor 1.2K ERD-14 VJ
R507,508	0B05608A	Carbon Resistor 220 ERD-14 VJ
R509,510	0B01793A	Carbon Resistor 3.3K ERD-14 VJ
R515	0B05649A	Carbon Resistor 150 ERD-14 VJ
C501,502	0B01862A	Electrolytic Capacitor 22μ 16 V
503,504		
C505,506	0B01913A	Mylar Capacitor 1800P 50 VJ
C507,508	0B05862A	Electrolytic Capacitor
509,510		2.2μ 16 V M (MS)
C511,512	0B05852A	Electrolytic Capacitor 1000μ 10 V
513,514		
	0J03594A	Volume Holder (1 pce.)
	0E00606A	Screw M3x6 Philips Pan Head (3A) (1 pce.)
	0B08308A	SW. Spacer (2 pcs.)

Note: Diode 1S1555 is compatible with FDH-999.

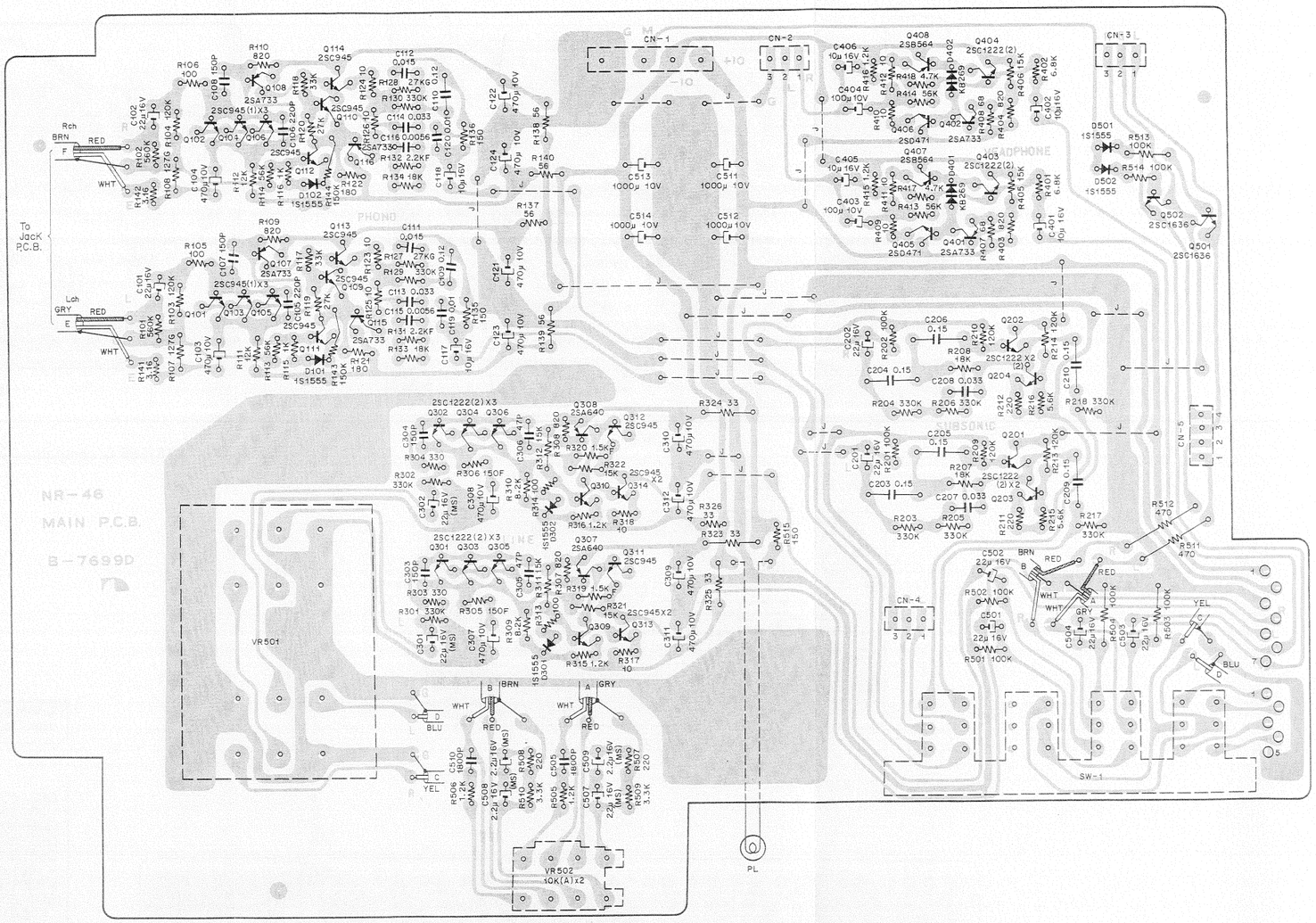


Fig. 5.1

5.2. Tone P.C.B. Ass'y

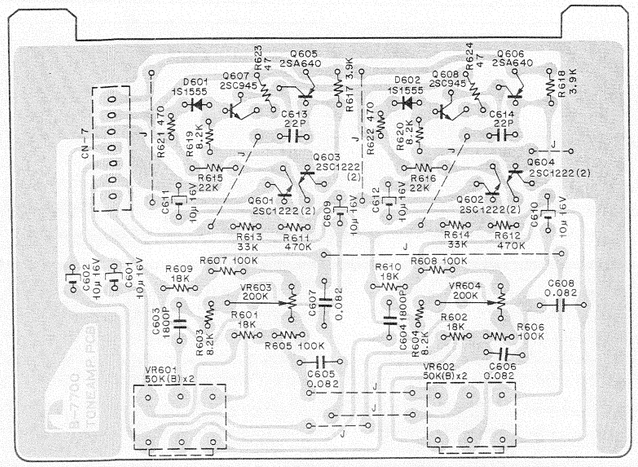


Fig. 5.2

5.3. Function SW. P.C.B. Ass'y

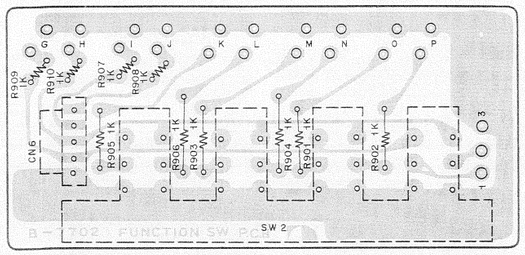


Fig. 5.3

5.4. Jack P.C.B. Ass'y

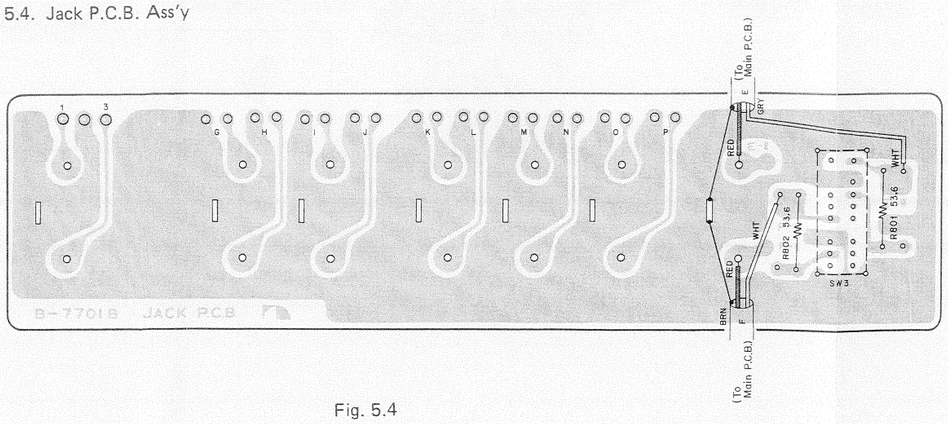


Fig. 5.4

5.5. Power Supply P.C.B. Ass'y

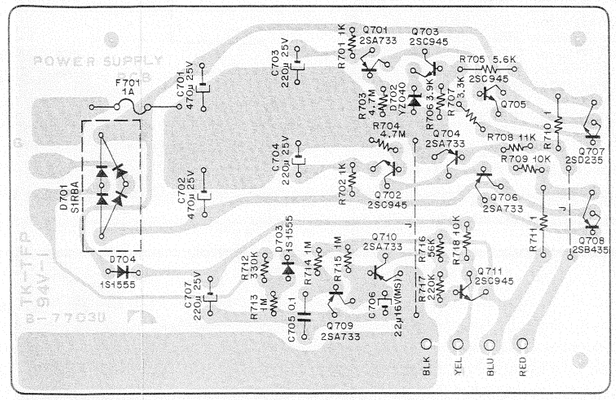


Fig. 5.5

Note: Diode 1S1555 is compatible with FDH-999.

Schematic Ref. No.	Part No.	Description
	BA03818A	**Tone P.C.B. Ass'y**
	0B07700A	Tone P.C.B.
Q601,602 603,604	0B06062A	Transistor 2SC1222 (2)
Q605,606	0B06111A	Transistor 2SA640 (E)
Q607,608	0B01872A	Transistor 2SC945
D601,602	0B01909A	Silicon Diode 1S1555
VR601,602	0B07146A	Volume 50K (B) x2
VR603,604	0B07154A	Semi-fixed Volume 200K
R601,602 609,610	0B05561A	Carbon Resistor 18K ERD-14 VJ
R603,604 619,620	0B01878A	Carbon Resistor 8.2K ERD-14 VJ
R605,606 607,608	0B01920A	Carbon Resistor 100K ERD-14 VJ
R611,612	0B05700A	Carbon Resistor 470K ERD-14 VJ
R613,614	0B01879A	Carbon Resistor 33K ERD-14 VJ
R615,616	0B05661A	Carbon Resistor 22K ERD-14 VJ
R617,618	0B05664A	Carbon Resistor 3.9K ERD-14 VJ
R621,622	0B01792A	Carbon Resistor 470 ERD-14 VJ
R623,624	0B05569A	Carbon Resistor 47 ERD-14 VJ
C601,602 609,610 611,612	0B01412A	Electrolytic Capacitor 10μ 16 V
C603,604	0B01913A	Mylar Capacitor 1800P 50 VJ
C605,606 607,608	0B05685A	Mylar Capacitor 0.082μ 50 VJ
C613,614	0B05806A	Ceramic Capacitor 22P 50 VK
CN-7	0B08302A	7P-T Post

Schematic Ref. No.	Part No.	Description
	BA03820A	**Function SW. P.C.B. Ass'y**
	0B07702B	Function SW. P.C.B.
R901,902 903,904 905,906 907,908 909,910	0B01781A	Carbon Resistor 1K ERD-14 VJ
SW2	0B07100A	Push SW. B 2222
CN4	0B08298A	3P-H Connector Ass'y
CN6	0B08303A	5P-S Post
	BA03819A	**Jack P.C.B. Ass'y**
	0B07701B	Jack P.C.B.
R801,802	0B05917A	Metal Film Resistor 53.6 ERO-25 CKG
SW3	0B07157A	Slide SW. SSA043
CN3	0B08297A	3P-H Connector Ass'y
	0B08304A	Pin-Jack Unit (1 pce.)
	BA03821A	**Power Supply P.C.B. Ass'y**
	0B07703U	Power Supply P.C.B.
Q701,704 706,709 710	0B06013A	Transistor 2SA733
Q702,703 705,711	0B01872A	Transistor 2SC945
Q707	0B01823A	Transistor 2SD235
Q708	0B06011A	Transistor 2SB435
D701	0B06088A	Diode S1RBA
D702	0B06063A	Zener Diode YZ040
D703,704	0B01909A	Silicon Diode 1S1555
R701,702	0B01781A	Carbon Resistor 1K ERD-14 VJ
R703,704	0B05824A	Carbon Resistor 4.7M ERD-14 VJ
R705	0B05673A	Carbon Resistor 5.6K ERD-14 VJ
R706	0B05664A	Carbon Resistor 3.9K ERD-14 VJ
R707	0B01793A	Carbon Resistor 3.3K ERD-14 VJ
R708	0B05826A	Carbon Resistor 11K ERD-14 VJ
R709,718	0B01833A	Carbon Resistor 10K ERD-14 VJ
R710,711	0B05746A	Carbon Resistor 1 ERD-14 VJ
R712	0B01921A	Carbon Resistor 330K ERD-14 VJ
R713,714 715	0B05564A	Carbon Resistor 1M ERD-14 VJ
R716	0B05563A	Carbon Resistor 56K ERD-14 VJ
R717	0B05596A	Carbon Resistor 220K ERD-14 VJ
C701,702	0B01401A	Eelctrolytic Capacitor 470μ 25 V
C703,704 707	0B01391A	Electrolytic Capacitor 220μ 25 V
C705	0B01780A	Mylar Capacitor 0.1μ 50V J
C706	0B05820A	Electrolytic Capacitor 22μ 16V M (MS)
F701	0B08176U	Fuse 1A
CN1	0B08296B	4P Jack Ass'y
	0J03597B	Heat Sink (1 pce.)
	0E00607A	Screw M3x8 Philips Pan Head (3A) (4 pcs.)
	0E00507A	Nut Hex. M3 (2 pcs.)

6. MECHANISM ASS'Y AND PARTS LIST

6.1. Synthesis

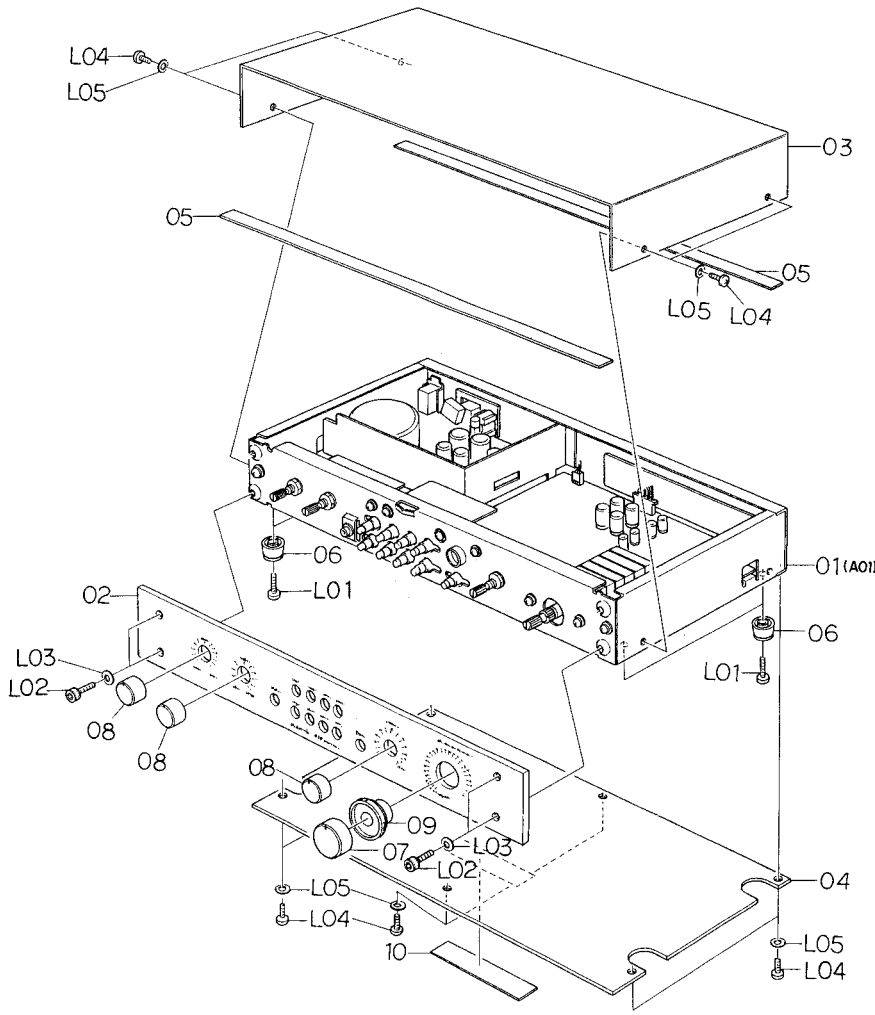


Fig. 6.1

Schematic Ref. No.	Part No.	Description	Q'ty
		Synthesis	
01		Mechanism Chassis Ass'y	1
02	HA03689A	Front Panel Ass'y	1
	0H03479D	Front Panel	1
	0H03484B	Indicator Point	1
03	0H03485B	Top Cover	1
04	0J03591B	Bottom Cover	1
05	0J03580A	Top Cover Hemilor	2
06	0J03564A	Foot T-H	4
07	0H03480B	VR Knob A	1
08	0H03481B	VR Knob B	3
	0H03410A	VR Sleeve	4
09	0H03482B	Balance Ring	1
	0H03483A	VR Sleeve C	1
10	0M03544A	Caution Label	1
L01	0E00655A	Screw M3x10 Philips Pan Head	4
L02	0E00747A	Bolt M4x15 Hex. Socket Head	4
L03	0J03556A	Washer 4mm	4
L04	0E00593A	Screw M3x6 Philips Binding Head (Bronze)	10
L05	0E00157A	Washer 4mm (Plastics)	10

6.2. Mechanism Chassis Ass'y (A01)

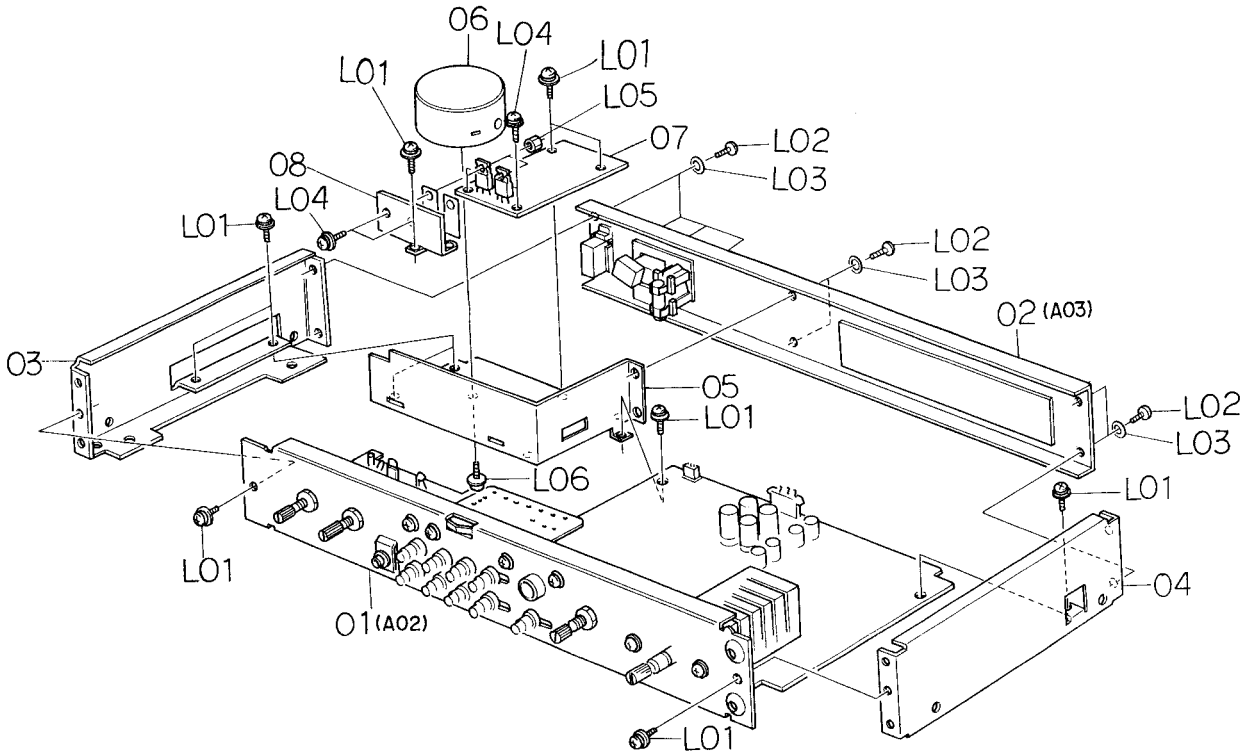


Fig. 6.2

Schematic Ref. No.	Part No.	Description	Q'ty
A01		**Mechanism Chassis Ass'y**	1
01	JA03143A	Front Chassis Ass'y	1
02	JA03144A	Rear Panel Ass'y	1
03	0J03588A	Side Chassis L	1
04	0J03589A	Side Chassis R	1
05	0J03595C	Transformer Holder	1
06	0B06555U	Power Transformer	1
07	BA03821A	Power Supply P.C.B Ass'y	1
08	0J03597B	Heat Sink	1
L01	0E00606A	Screw M3x6 Philips Pan Head (3A)	9
L02	0E00593A	Screw M3x6 Philips Binding Head (Bronze)	8
L03	0E00157A	Washer 3mm (Plastics)	8
L04	0E00607A	Screw M3x8 Philips Pan Head (3A)	4
L05	0E00507A	Nut Hex. M3	2
L06	0E00643A	Screw M4x8 Philips Pan Head (3A)	1
A02	**JA03143A**	**Front Chassis Ass'y**	1
01	0J03587D	Front Chassis	1
02	0J03592A	SW. Plate	1
03	0J03593A	SW. Holder	1
04	0J03570A	Lamp 16V 40mA	1
05	0J03600C	Lamp Shade B	1
	0J03598B	Reflector	1
06	0J03599B	Lamp Filter (Orange)	1
07	JA03061A	Push Button Ass'y	9
08	BA03817A	Main P.C.B. Ass'y	1
09	BA03818A	Tone P.C.B. Ass'y	1
10	BA03820A	SW. P.C.B. Ass'y	1
11	BA03822A	Headphone Jack Ass'y	1
12	0B07158U	Power SW.	1
13	0J03594A	VR Holder	1
L01	0E00606A	Screw M3x6 Philips Pan Head (3A)	7
L02	0E00612A	Screw M3x6 Philips Pan Head (2A)	6
L03	0E00611A	Screw M3x14 Philips Pan Head (3A)	4
A03	**JA03144A**	**Rear Panel Ass'y**	1
01	0J03590C	Rear Panel	1
02	BA03819A	Jack P.C.B. Ass'y	1
03	0J03435B	Outlet Holder	1
04	0B08162U	AC Socket	2
05	0B08240U	Spark Killer	1
06	0B08310U	Fuse Holder	1
07	0B08047U	Fuse 1A	1
08	0B07092U	Voltage Selector SW.	1
09	0A03154B	Cord Spacer	1
10	0B08037U	Cord Bushing	1
11	0B03900U	Power Cord	1
12	0M03737A	Voltage Lock Plate	1
13	0B03920A	Ground Terminal	1
L01	0E00593A	Screw M2.6x3 Philips Pan Head Head (Bronze)	6
L02	0E00157A	Washer 3mm (Plastics)	10
L03	0E00748A	Screw M2.6x3 Philips Pan Head (Bronze)	2
L04	0E00732A	Washer 3mm	1
L05	0E00172A	Washer 3mm Toothed Lock	1
L06	0E00507A	Nut Hex. M3	1
L07	0E00612A	Screw M3x6 Philips Pan Head (2A)	1
L08	0E00594A	Screw M3x8 Philips Binding Head	4

6.3. Front Chassis Ass'y (A02)

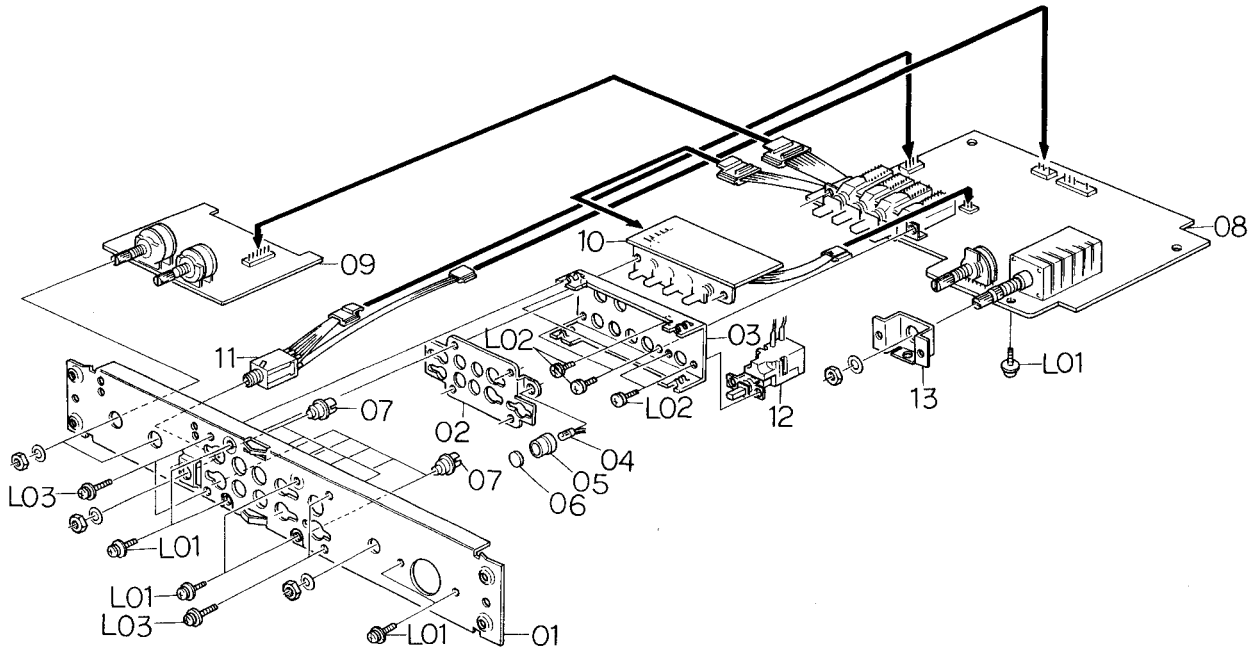


Fig. 6.3

6.4. Rear Panel Ass'y (A03)

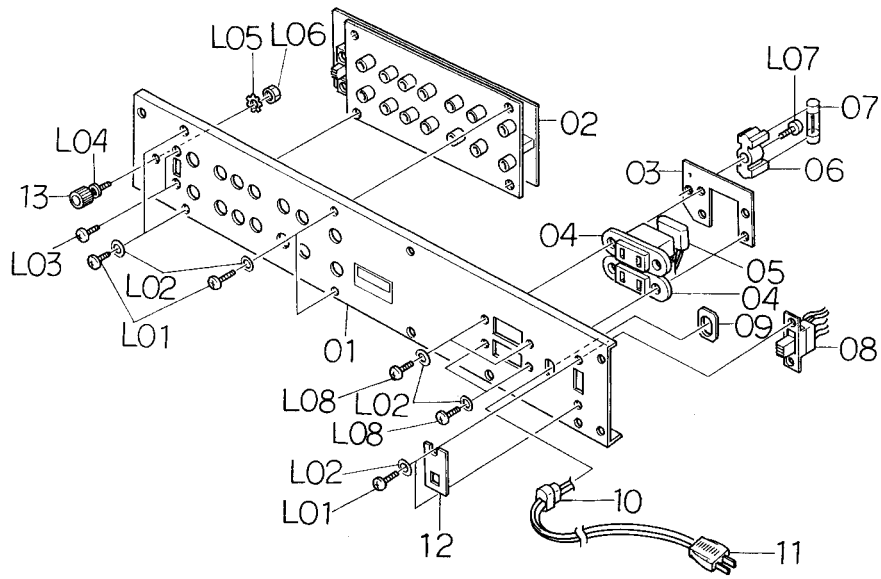


Fig. 6.4

7. WIRING DIAGRAM

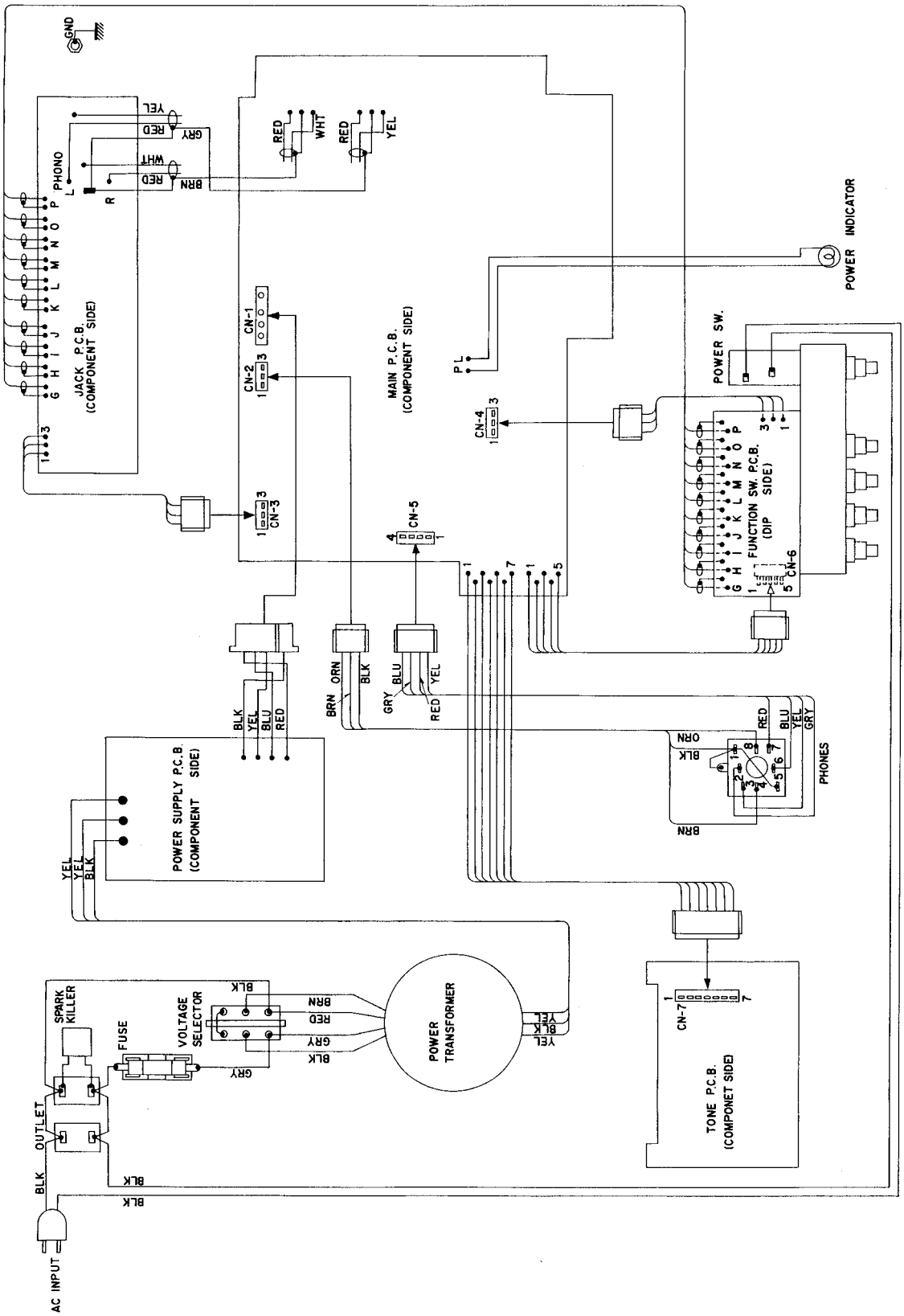
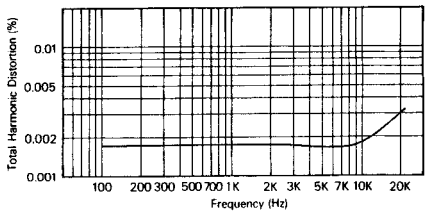
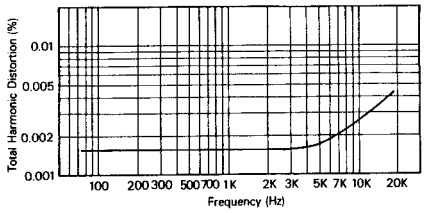


Fig. 7

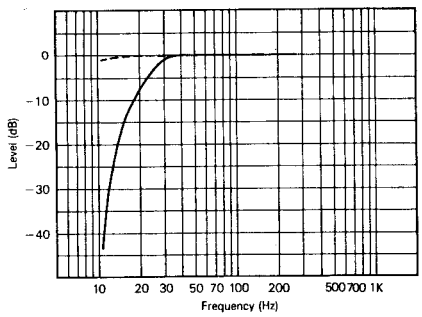
8. PERFORMANCE DATA



Frequency vs Total Harmonic Distortion
Phono Input Output: 2V Constant
Input: 2mV

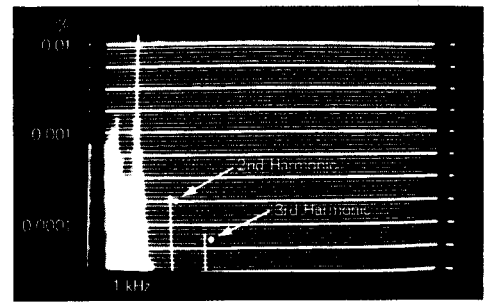


Frequency vs Total Harmonic Distortion
Aux Input Output: 2V constant

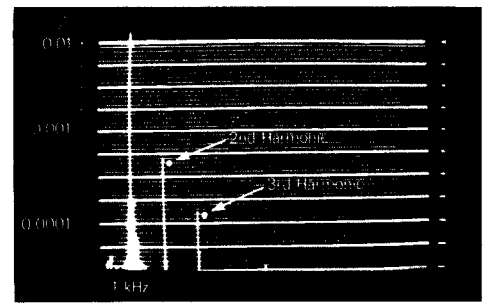


Phono Subsonic Filter

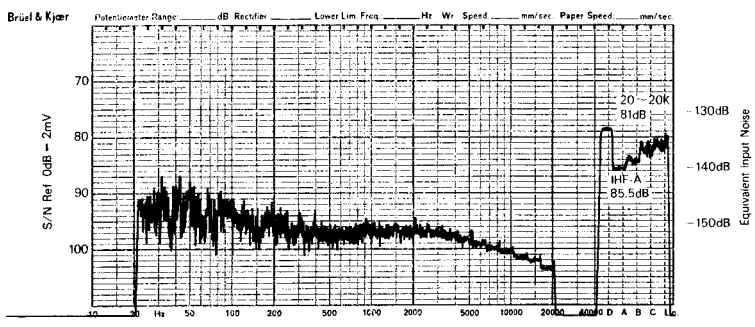
Spectral Analysis of Harmonic Distortion
(B & K 3348 Real Time Spectrum Analyzer)



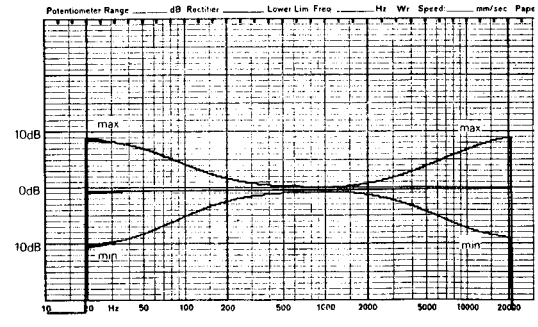
Frequency vs Harmonic Distortion
Frequency: 1 kHz
Input: Phono (2 mV sensitivity)
Output: Record output (1V)



Frequency vs Harmonic Distortion
Frequency: 1 kHz
Input: Aux
Output: Preamp output (1V)
(Volume @ max.)



RIAA Equalizer Amplifier (Phono) Noise Characteristics



Tone Control Characteristics

Fig. 8

9. BLOCK DIAGRAM AND LEVEL DIAGRAM

9.1. Block Diagram

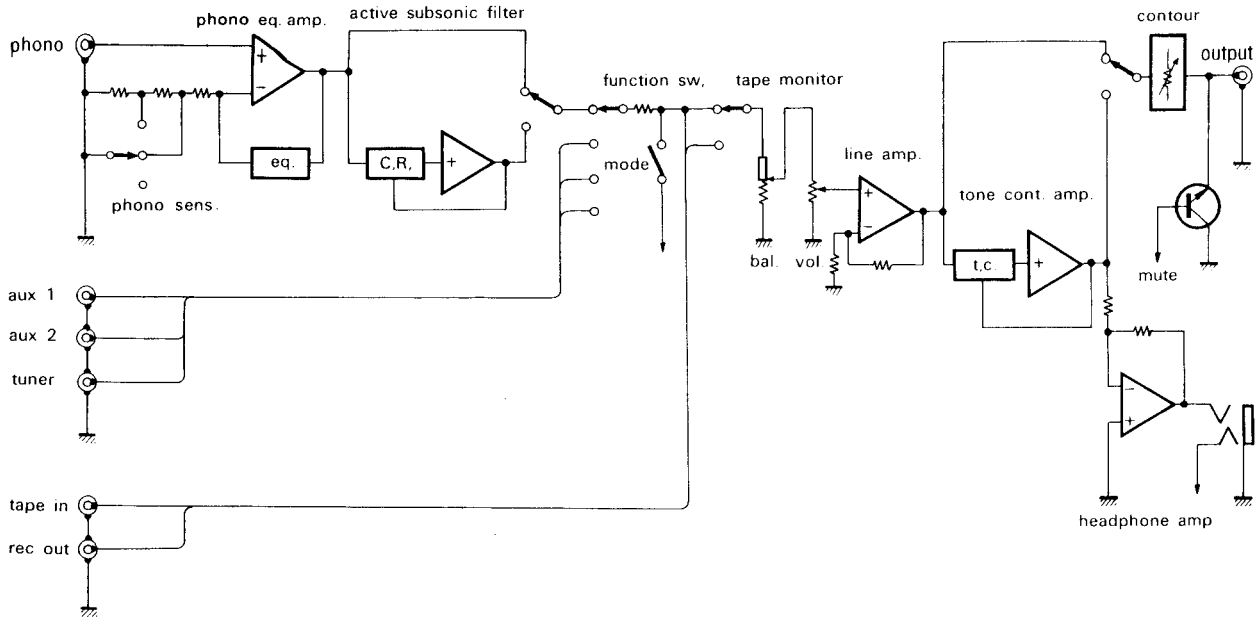


Fig. 9.1

9.2. Level Diagram

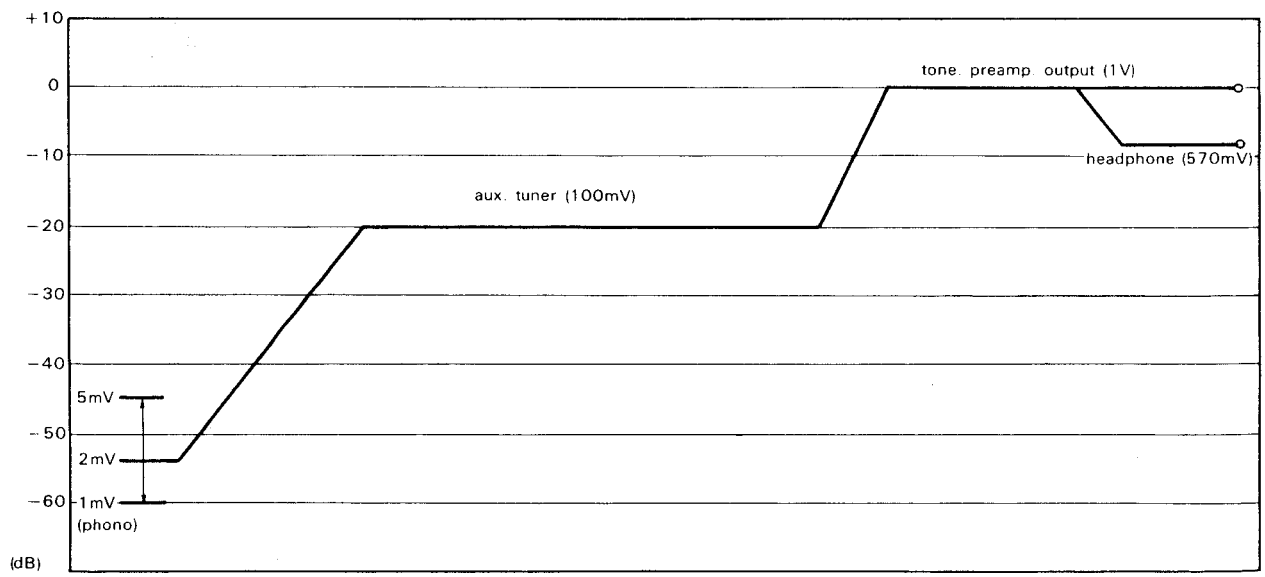


Fig. 9.2

10. SCHEMATIC DIAGRAM

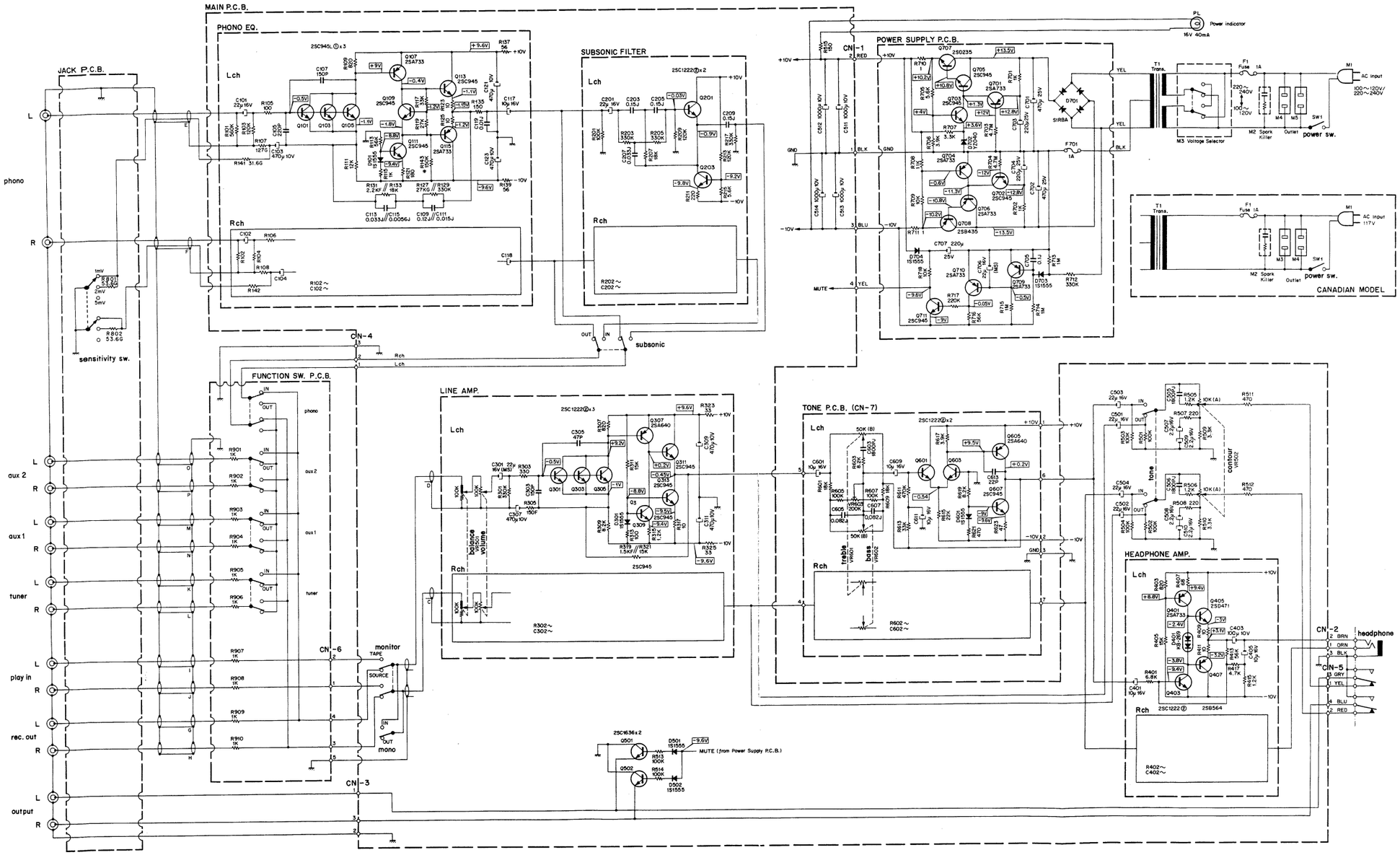


Fig. 10

410

11. SPECIFICATIONS

Power Source	100-120/220-240V AC, 50/60 Hz
Power Consumption	20 VA
Input Sensitivity/Impedance	
phono	1 mV, 2 mV, 5 mV/100k ohms
aux, tuner	100 mV/50k ohms
tape monitor	100 mV/50 k ohms
Maximum Input Levels	
phono	250 mV (1 kHz, 5 mV position)
aux, tuner, tape monitor	15 V (−30 dB), 50 V (−40 dB)
Output Levels (@0 dB)/Output impedance/min. load impedance	
output	1 V/500 ohms/10k ohms
rec out	100 mV/1k ohms/50k ohms
headphone	40 mW/4.5 ohms/8 ohms
Maximum Output at Clipping	
output	5 V into 50k ohms
rec out	4 V into 50k ohms
headphone	300 mW into 8 ohms
Frequency Response	
phono RIAA deviation	Within ±0.3 dB (2 mV)
aux, tuner	20–50,000 Hz +0, −1.5 dB
tape monitor	20–50,000 Hz +0, −1.5 dB
Signal-to-Noise Ratio (IHF-A)−(ref. level)/equivalent input noise	
phono	better than 80 dB (1 mV)/−140 dB
aux, tuner, tape monitor	better than 102 dB
Residual Noise Level (IHF-A)	
headphone (8 ohms)	8 microvolts or less
line out	4 microvolts or less (VR @ min.)
Distortion	
phono	less than 0.003% at all freq. up to 10 kHz
aux, tuner, tape monitor	less than 0.003%
Tone Control	
bass	±9 dB @ 20 Hz
treble	±9 dB @ 20 kHz
Contour	3 kHz −30 dB (VR 8) 20 Hz −14 dB 20 kHz −25 dB
Sub-sonic Filter	30 Hz −1.8 dB 20 Hz −8.5 dB 10 Hz −45 dB 5 Hz −38 dB
Miscellaneous	
AC outlets	2, switched, 350 VA max.
Dimensions	16(W) x 3-5/32(H) x 8-1/2(D) inches 400(W) x 80(H) x 215(D) m/m
Weight	9 lbs. (approx.) 4 kg

- Specifications and appearance design are subject to change for further improvement without notice.

Service Manual

Nakamichi 410

Nakamichi Research Inc.
1-153 Suzukicho, Kodaira, Tokyo
Phone: (0423) 42-1111
Telex: 2832610 (NAKREI J)
Cable: NAKAMICHI KOKUBUNJI

Nakamichi Research (U.S.A.), Inc.
220 Westbury Avenue,
Carle Place, N.Y. 11514
Phone: (516) 333-5440
Telex: 144513 (NAKREI CAPL)

1101 Colorado Avenue,
Santa Monica, Calif. 90401
Phone: (213) 451-5901
Telex: 652429 (NAKREI SNM)

O-80210B Printed in Japan